

Straight to the Bottom Line- 11/5/12

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Title- "Nutrition Models and the Art and the Science of Feeding Dairy Cows"

The process of formulating diets for livestock has changed over the last 100 years. In the early days, scientists developed techniques to quantify things like protein and caloric levels in feedstuffs. Research was then needed to determine the animal's requirement of these newly found nutrients. I am sure you have heard the term "crude" used in front of a few nutrients like protein, fat and fiber. The reason the word crude is there is to state that the measurements in many ways were "crude" and did not measure exactly the pure nutrient as intended. But, these were key strides in gaining expertise in feeding animals better and that was the goal.

Speed ahead about 100 years to today where we use dynamic models with complicated equations to mix diets in a computer. We moved from terms like TDN, crude fiber and crude protein to more modern terms like net energy, NDF and metabolizable protein. As well, crude fat and crude protein measures were better described by dividing these crude measures into actual amounts of various amino acids and fatty acids. All of these discoveries allowed us to better target the nutrient requirements to meet animal production goals. Alongside the focus on better describing the true nutrient value of the feedstuffs was an equally significant effort to determine how much of these newly found ingredients were needed by the animals at various stages of growth, production and reproduction. Later, we will discuss how these values in the feed and the animal come together in building successful diets. But first, aren't we forgetting that feeding dairy cows is not just a science, but also an art?

So how do you handle that question about art versus science? We know for sure that both are important. I think you could substitute the word "experience" for "art" and describe it better. But, that doesn't mean that feeding cows doesn't require some non-mathematical wisdom. And for sure, this part is harder to teach and is mostly learned from your own experience. I know that one person's art might not work in another person science. I also suspect that some of this art is really a learned adjustment for where the science doesn't have it explained just right. I am not sure that another person can even teach you this art. I think you have to learn it from the cows themselves. This is the part of formulating rations that is not very academic and can't be explained to the computer. It is the tweaks and adjustments to either nutrient levels or requirements that have yielded success for you in the past. In this step, you will most likely get manure and possibly some silage crud on you.

In next month's column, we will discuss the thought process behind modeling nutrition in a dairy cow and how that ends up in a formulation tool used to actually build rations for cows. Before we get there though, what are some of these issues that would fall into the art of formulating diets? I think the first issue that you can't describe to the computer is palatability. A ration might look perfect on paper, but if there are ingredients in the mix that reduce intake, the results might not be satisfactory. Most of these palatability issues are things that need to be assessed in person and there is no math involved. Palatability is not the only thing that influences intake in dairy cows. There are many other factors and these intake variations are nearly impossible to describe to a computer nutrition model. In many cases, to put it in layman terms, "the cows are gonna eat what the cows are gonna eat"! That is not 100% true, but be sure, there is no "intake control knob" on the side of a dairy cow.

Related to palatability is how do ingredients and blends of ingredients mix together and how do we present them to the cows. Bunk presence, sortability, bunk stability and moisture are among the factors that will influence results. Some guidelines exist to help with some of these bunk issues, but experience will be the main teacher. Rations that look perfect in every way in an office somewhere far away might be a disaster in the bunk at a dairy farm. The “art” of feeding cows can’t be ignored.

Next month we will talk more about the science of formulating diets and the recent strides in how we do that at a field level. At the end of the day, it is the responsibility of the formulator to be sure the ration on paper meets established requirements and is in a form that will allow the cow to consume it and efficiently convert it into a sellable product. It takes both science and art to get that done!